and (ii) the dispensing orifice is below the upper threshold of the laser beam; (a) moving the cartridge towards the laser beam and stopping said movement as soon as the laser beam is interrupted by the cartridge, wherein the position at which the laser beam is interrupted by the cartridge is the first y position; (b) re-positioning the cartridge so that the cartridge is located in the second y octant and the dispensing orifice is below the upper threshold of the laser beam; (c) moving the cartridge towards the laser beam and stopping said movement as soon as the laser beam is interrupted by the cartridge, wherein the position at which the laser beam is interrupted is the second y position; (d) and calculating the mid-point between the first y position and the second y position. In another embodiment, calibrating the position of the cartridge along the x-axis by use of a horizontal laser comprises: (a) positioning the cartridge (i) at the mid-point between the first y position and the second y position, and (ii) outside the sensor threshold of the laser; (b) moving the cartridge towards the sensor threshold and stopping said movement as soon as the cartridge contacts the sensor threshold; (c) wherein the position at which the cartridge contacts the sensor increased by half the cartridge width is the x position. In another embodiment, calibrating the position of the cartridge along the z-axis by use of a horizontal laser comprises: (a) positioning the cartridge so that the dispensing orifice is located above the laser beam; (b) moving the cartridge towards the laser beam and stopping said movement as soon as the laser beam is interrupted by the cartridge, wherein the position at which the laser beam is interrupted is the z position. In another embodiment, calibrating the position of the cartridge along the y-axis by use of a vertical laser comprises: (a) positioning the cartridge so that the cartridge is (i) located in a first y octant and (ii) the dispensing orifice is outside the sensor threshold of the laser beam; (b) moving the cartridge towards the laser beam and stopping said movement as soon as the laser beam is interrupted by the cartridge, wherein the position at which the laser beam is interrupted by the cartridge is the first y position; (c) re-positioning the cartridge so that the cartridge is located in the second y octant and the dispensing orifice is outside of the sensor threshold of the laser beam; (d) moving the cartridge towards the laser beam and stopping said movement as soon as the laser beam is interrupted by the cartridge, wherein the position at which the laser beam is interrupted is the second y position; (e) calculating the mid-point between the first y position and the second y position; and (f) optionally, repeating (a)-(e) and averaging calculated mid-points. In another embodiment, calibrating the position of the cartridge along the x-axis by use of a vertical laser comprises: (a) positioning the cartridge so that the cartridge is (i) located in a first x octant and (ii) the dispensing orifice is outside the sensor threshold of the laser beam; (b) moving the cartridge towards the laser beam and stopping said movement as soon as the laser beam is interrupted by the cartridge, wherein the position at which the laser beam is interrupted by the cartridge is the first x position; (c) re-positioning the cartridge so that the cartridge is located in the second x octant and the dispensing orifice is outside of the sensor threshold of the laser beam; (d) moving the cartridge towards the laser beam and stopping said movement as soon as the laser beam is interrupted by the cartridge, wherein the position at which the laser beam is interrupted is the second x position; (e) calculating the mid-point between the first x position and the second x position; and (f) optionally, repeating (a)-(e) and averaging calculated mid-points. In another embodiment, calibrating the position of the cartridge along the z-axis by use of a vertical laser comprises: (a) positioning the printer head so that the dispensing orifice is located above the laser beam and outside of the laser sensor range threshold; (b) moving the printer head along the z-axis the sensor threshold is reached; wherein, the z-position is the position at which the laser sensor threshold is reached; and optionally, repeating steps (a) and (b) and calculating average z-positions. In another embodiment, calibrating the position of the cartridge along the z-axis comprises: visually determining the position of the dispensing orifice.

[0007] Further described herein are systems for calibrating the position of a cartridge comprising a dispensing orifice, wherein the cartridge is attached to a bioprinter, said system comprising: a means for calibrating the position of the cartridge along at least one axis, and wherein the axis is selected from the y-axis, x-axis, and z-axis. In one embodiment, the means for calibrating the cartridge is laser alignment, optical alignment, mechanical alignment, piezoelectric alignment, magnetic alignment, electrical field or capacitance alignment, ultrasound alignment, or a combination thereof. In another embodiment, the means for calibrating the cartridge is laser alignment. In yet another embodiment, the laser alignment means comprises at least one laser, selected from a horizontal laser and a vertical laser. In yet another embodiment, the laser alignment means comprises a horizontal laser and a vertical laser. In yet another embodiment, the laser alignment means is accurate to ±40 μm on the vertical axis and ±20 on the horizontal axis.

[0008] Further described herein are methods for fabricating tissue constructs, comprising: a computer module receiving input of a visual representation of a desired tissue construct; a computer module generating a series of commands, wherein the commands are based on the visual representation and are readable by a bioprinter; a computer module providing the series of commands to a bioprinter; and the bioprinter depositing bio-ink and support material according to the commands to form a construct with a defined geometry. In some embodiments, a computer module comprises a display screen. In further embodiments, a computer module comprises a graphical user interface (GUI). In still further embodiments, a user defines the content of one or more objects to form a visual representation of a desired tissue construct using a GUI provided by the computer module. In one embodiment, the display screen consists essentially of a grid comprising a plurality of objects of substantially the same shape and substantially equal size. In yet another embodiment, each object is in the shape of a circle. In yet another embodiment, the user defines the content of one or more objects to form a visual representation of a desired tissue construct. In yet another embodiment, the user defined content of an object is selected from bio-ink or support material. In further embodiments, the display screen consists of three-dimensional rendering(s) that are input by the user electronically or manually, whereby the various components of the three-dimensional rendering can be adjusted in any suitable plane or vector prior to executing a bioprinting protocol on the bioprinter.

[0009] Further described herein are methods of attaching a cartridge to a bioprinter, comprising: (a) inserting the cartridge into a collet chuck, wherein the collet chuck is attached to a printer head of the bioprinter; and (b) adjusting